

Performance evaluation of electrochemical sensors modified with functionalized graphene

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Abstract

The aim of this study is to develop an electrochemical sensor for detection of Paraquat in water. Paraquat is a pesticide of great interest in research because of its severe acute toxicity and neurotoxicity after long-term exposure [1]. The electrochemical sensor is based on a graphene-acid-modified glassy carbon electrode functionalized with iron nanoparticles (GA-Fe) [2]. In this study, the following electrochemical properties of GA-Fe: high conductivity, selectivity and accelerated electron transfer on the electrode surface, are adapted to improve the analytical performance of the sensor [3][4]. Electrochemical measurements were performed using the following electrochemical methods: cyclic voltammetry CV, square wave voltammetry SWV and electrochemical impedance spectroscopy EIS. Moreover, the operating conditions for the cyclic voltammetry technique, square wave voltammetry technique and pH value have been optimized. The obtained results, indicate that the GCE/GAFe-based sensor exhibits a significant electrochemical response at potential value $E = -0.65V$ with linear range 0.25-1.25 and sensitivity of $0.0744\mu A/mM$. The sensor has also been tested on structurally similar to Paraquat pesticides such as Imidacloprid and Thiamethoxam.

References

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Figures

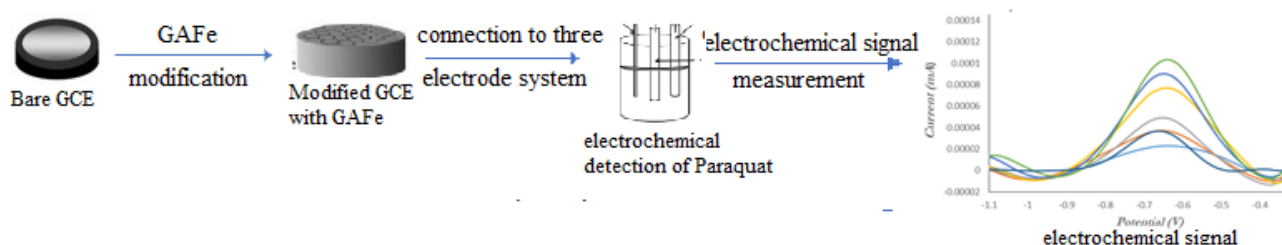


Figure 1: Electrochemical detection of Paraquat using glassy carbon electrode modified with GA-Fe.